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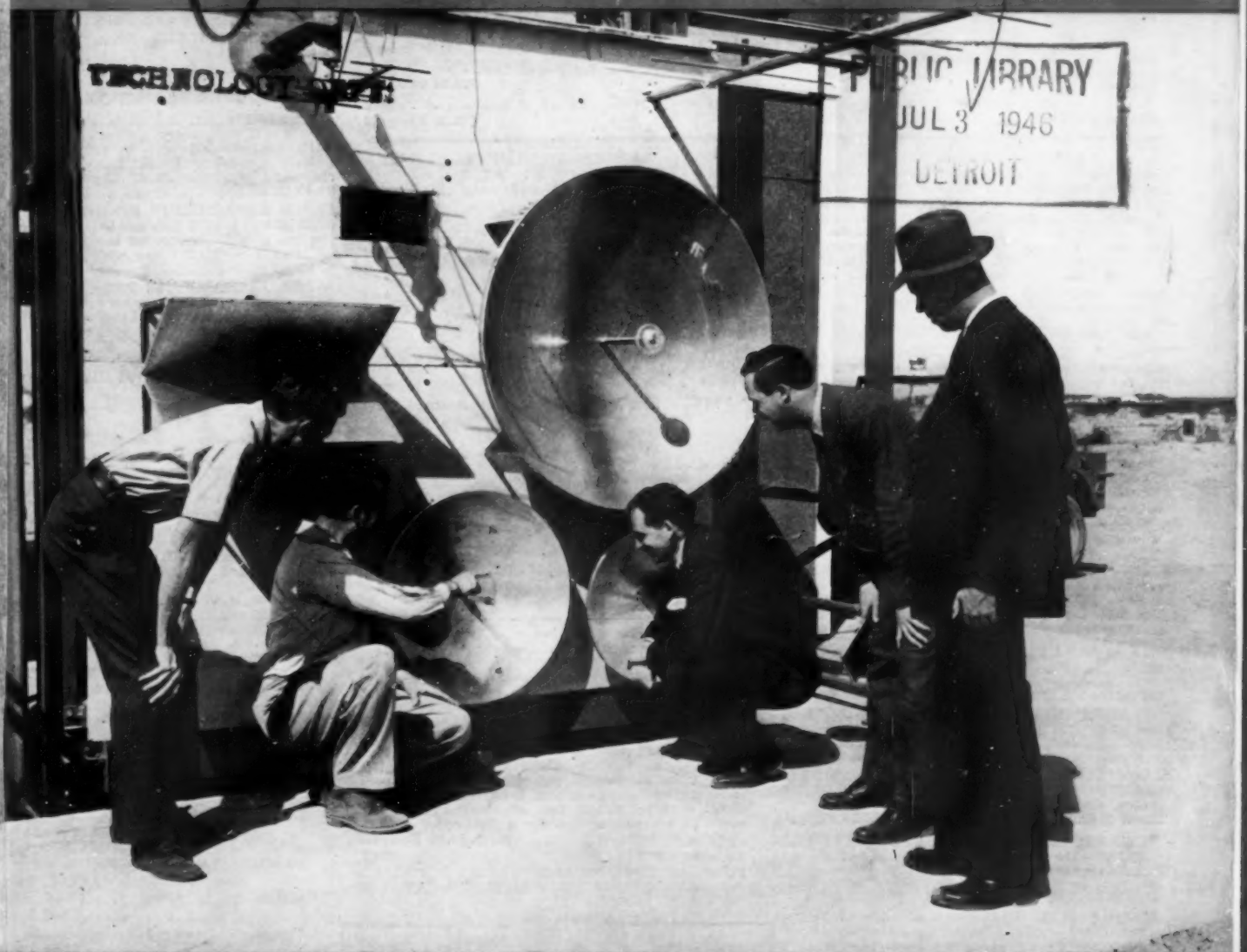
SCIENCE NEWS LETTER

Vol. 49, No. 26

THE WEEKLY SUMMARY OF CURRENT SCIENCE • JUNE 29, 1946



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See Page 404

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CHEMISTRY

Cane Sugar Synthesized

A method for building up synthetic sucrose has been discovered for the first time, and used to make two new sugars never known before.

➤ FOR FINDING the key to the sugar molecule, which enabled them to build up synthetic cane sugar for the first time from simpler compounds, Drs. W. Z. Hassid, M. Doudoroff and H. A. Barker, research workers at the University of California, have been awarded the first intermediate $5,000 Sugar Research Foundation prize from the National Science Fund of the National Academy of Sciences.

Coincidentally, it was learned that two sugars never found in nature have been invented by these scientists.

Cane sugar is a double molecule, built up of two simpler sugar molecules. Many earlier attempts to link up the simpler sugars have failed because the role of phosphate compounds in building up the more complex molecule was not appreciated. The California scientists succeeded, with the aid of an enzyme obtained from a culture of the bacterium *Pseudomonas saccharophila,* in combining glucose phosphate with fruit sugar to make the same sugar we get from sugar cane or sugar beets. The phosphorus compound pulls the two simple sugars together, then steps out of the picture. Until the experiments of Dr. Hassid and his colleagues, the part played by the phosphate group was not known to be essential.

Two New Sugars

Having found the key to the problem, the research group has since used this new method to make two other sugars unknown in nature and never seen or tasted by man before.

Three kinds of double sugars, in addition to cane sugar, are known in nature. One of these is lactose, or milk sugar. Another is maltose, formed in sprouting grain, which feeds beer yeasts and contributes to the flavor of malted milk. The third is cellobiose, formed by chemical treatment of wood. These three kinds of sugar are made up of pairs of similar molecules.

One of the new synthetic sugars made by the California scientists follows essentially the same pattern. Glucose phosphate was made to combine with sorbose to make glucosido-sorboside, an unknown product, instead of glucosido-fructoside, the material for which your grocer collects ration stamps.

But sorbose, the unusual constituent of the new sugar, is not very different from glucose. Similar arrangements of the same atoms make up its molecule. The two differ only in whether certain groupings of atoms occur on the right side or the left side of the molecular structure. Such differences make some alteration in how fast sugars dissolve and how sweet they taste, but chemically sorbose and glucose are two of the possible 16 sugars of the same pattern. Linking these sugars results in double sugars of the maltose, lactose, cellobiose type.

"Tagged Atom" Technique

The second new sugar formed by Dr. Hassid and his co-workers is built more on the pattern of cane sugar. The simple sugar which is joined to the glucose phosphate is ketoxylose. The structure of ketoxylose is similar to that of the fructose half of the cane sugar molecule. Both are ketoses, whose structure is fundamentally different from that of glucose, although both contain equal numbers of the same carbon, hydrogen and oxygen atoms.

Now that the simple sugars, which can be put together chemically, have been synthesized to double sugars by the new process, the research group hopes to be able to use the new "tagged atom" technique, made available by atomic research, to learn what use is made by the body of the two halves of the sugar molecule.

Each half could be studied separately as it undergoes transformation to blood sugar, which plays such an important part in nutrition and body chemistry. The newly appreciated importance of phosphorus compounds in sugar synthesis can also be followed by the introduction of compounds of the radioactive phosphorus isotope into the reactions discovered by Drs. Hassid, Doudoroff and Barker.

The synthesis of sucrose or of the new sugars will find no use in increasing the food supply. These researches will not lessen the sugar shortage.

New compounds of the many sugar-like substances already known, and perhaps others, to be formed by modifications of known processes, will bring to research workers many opportunities to learn how the growing plant builds up the carbohydrates upon which we in common with all animal life depend for food.

Science News Letter, June 29, 1946

PHYSICS

Electron Microscope's Magnification Doubled

➤ THE USEFUL magnifying power of the electron microscope has been increased from 100,000 diameters to more than 200,000 diameters by an improved magnetic lens developed by Dr. James Hillier, aided by Perry C. Smith, at the RCA laboratories.

This great step forward in the conquest of the sub-microscopic world was disclosed in a paper communicated to the American Institute of Physics (*Journal of Applied Physics,* April). Dr. Hillier reported that he had succeeded in improving the magnetic lenses that focus the electron beams to such an extent that it is now possible to distinguish particles separated by as short a distance as 13 Angstrom units, or about 50 billionths of an inch. This means roughly that 50,000 distinct particles could be recognized in a distance equal to the width of a hair. Dr. Hillier pointed out, however, that numerous technical problems still await solution before such high resolving power will be available to scientists generally.

Just how much this new development will affect science is difficult to predict, but it is thought that structural details of large molecules and the action of drugs on bacteria will be among the things that will become visible. Actual visual pictures of molecular structure will open vast new fields in organic chemistry, the science that has already given us nylon, rayon and other plastics, as well as synthetic rubber and life-saving drugs. In the field of medicine, it is certain that our new knowledge of the finer structure of viruses and living cells will aid us greatly in our fight against such still unconquered diseases as infantile paralysis and cancer.

Science News Letter, June 29, 1946

RADIO

2,000 Mile Short-Wave

See Front Cover

➤ TELEVISION, RADAR and ultra short-wave radio transmissions over 2,000 miles, and faster data for forecasting the weather, may all result from studies being conducted by the Navy at an abandoned Army air base at Gila Bend, Ariz.

Under the sponsorship of the Navy's Bureau of Ships, scientists from the Navy Electronics Laboratory, San Diego, Calif., are working on a $500,000 project for studying the effects of weather changes on high frequency radio transmission.

Dr. John B. Smyth, who heads the scientists on the project, predicts that the study of weather conditions may extend the range of ultra short-wave radio and radar transmissions, and ultimately television, as much as 2,000 miles. Ultra short-wave radio transmissions are now limited to 150 miles.

Scientists on the project will not admit that weather forecasting from radio transmissions is yet likely, but the project has already used this system to detect atmospheric changes ahead of the best meteorological instruments.

Based on the suspicion of scientists that the wide variation in the range of high frequency radio waves is due to weather conditions such as the temperature, air pressure and humidity, the studies were started early in 1945 to determine what frequencies would send out transmissions best under different weather conditions.

The extended range for high frequency waves is expected to result from data showing which frequencies should be used for various conditions of weather.

Three 200-foot towers have been constructed at the former $2,500,000 Army air base at intervals of 25 miles. The Gila Bend tower has transmitters that can be raised and lowered to vary the height of transmissions sent at frequencies ranging from 170 to 24,000 megacycles. Other towers at Datelan and Sentinel contain receivers, while each tower has a complete set of weather instruments.

Weather instruments set along the course keep records of the temperature and humidity at the time of transmissions and stationary kytoons (kite balloons) chart the weather above the towers.

Similar experiments have been conducted over water using towers at Point Loma and San Pedro, Calif.

The Gila Bend project has brought visiting scientists from Great Britain, Canada and Australia, and the University of California and the University of Texas are using the project's facilities for related research projects.

The picture on the front cover of this SCIENCE NEWS LETTER shows Dr. John B. Smyth and assistant explaining features of the radio transmitters to visiting British scientists at the Gila Bend tower.

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Official U. S. Navy photograph

200 FEET UP—A close-up of the steel tower at Gila Bend showing the elevator with transmitter being hoisted to the top.

BIOCHEMISTRY

Corn Cob Mixture Blasts Carbon Off Engine Parts

➤ CARBON that forms in the engine of your car can now be blasted off with a mixture of ground corn cobs and rice hulls in an ordinary sand-blasting machine instead of the tedious scraping job used in most garages.

At the first showing of the new process, carbon-covered cylinders and other automobile engine parts were quickly brought to a shine with the soft grit blasting. Developed by the Bureau of Agricultural and Industrial Chemistry at the Department of Agriculture Laboratory at Peoria, Ill., the blasting mixture uses 60% ground corn cobs and 40% ground rice hulls.

Discovered during the war, the soft grit blasting was first used on airplane engines by the Navy, and a plant at Bloomington, Ill., produced the new blasting material for Naval use.

Sand-blasting machines are used for the *process,* but ordinary sand blasting would damage the part being cleaned. The corn cob and rice hull mixture removes the carbon and grease without damage to the surface of engine parts.

Science News Letter, June 29, 1946

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BIOCHEMISTRY

Bones Make Red of Blood

Hemoglobin is manufactured by bone marrow much faster than has hitherto been supposed, as proved by tracer work with radioactive iron.

➤ TRACER experiments with radioactive iron show that the bone marrow manufactures the red blood pigment, hemoglobin, much more rapidly than had been supposed and that the liver acts as a storehouse for iron.

These new findings have been reported by two University of California researchers, Dr. D. Harold Copp, instructor in physiology, and Dr. David M. Greenberg, professor of biochemistry, who used a superior radioactive isotope of iron for the first time in tracer work.

They found that within three hours some of the radioactive iron appeared in the red blood cells, an amazingly rapid absorption, and that within 24 hours one-third to one-half of all the absorbed radioactive iron has been transferred to these cells.

When there is no deficiency, iron is stored in the liver, and is transferred to the bone marrow for use in the production of hemoglobin when iron is removed from the diet. Thus the stored iron postpones the appearance of deficiency symptoms such as anemia.

Drs. Copp and Greenberg found that there is no liver storage when hemoglobin manufacture is stimulated by iron deficiency, by the action of small amounts of copper or cobalt, or following severe blood loss. The metal, in these cases, is being used rapidly by the bone marrow.

While the experiments were performed with rats the findings are significant for man as well, since the metabolism of this animal is much like that of the human species.

The experiments were performed with iron 55, a radium-like member of the iron family produced by bombardment of manganese in the cyclotron. This isotope of iron was identified and separated at the University of California, the work being done by Prof. Glenn T. Seaborg, co-discoverer of plutonium, and by Dr. Martin Kamen, now at Washington University, St. Louis.

Iron 55 can be produced in a very pure form though in minute quantities too small for human research. Because of its purity it is superior for biological research to iron 59, the isotope previously used for "tracer" work. Iron 59 is diluted by a large percentage of non-radioactive iron which makes it necessary to give doses up to 1000 times those used in work with iron 55.

In their experiments the researchers fed anemic and normal rats 15 microgram doses—hardly more than enough to cover a pin point—of iron 55. The animals were then sacrificed at intervals, and the radioactivity in the various organs was counted by a Geiger counter.

The iron from the sacrificed animals was electroplated to make counting easier, and a special Geiger counter, of extreme sensitivity, was devised to catch the very weak radiations of iron 55.

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ENGINEERING

Belt Conveyors Reduce Accident Hazards

➤ BELT CONVEYORS in coal mines, to carry the coal from working faces to outlets, reduce accidents, the American Mining Congress was told.

Ray Cobb of the West Kentucky Coal Company described the operation of these endless belts, made of a wide strong fabric running on rollers, which are used instead of underground railways. Over 130 miles of them are in operation in American coal mines, first installation being made less than two decades ago.

One of the advantages is that the belt conveyor delivers a constant flow of coal from all sections of the mine to the coal tipple. The whole conveying system is started simultaneously by pushing a button. The haulage system needs only a minimum of supervision.

Railway equipment is still the most widely used method of underground coal transportation, C. R. Nailler and C. C. Hagenbuch of the Hanna Coal Company emphasized at the same meeting. Improvements have been made in the past decade in track-mounted equipment. Such equipment, they said, properly installed and maintained, will provide adequate, profit-producing haulage between coal face and tipple.

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MATHEMATICS

Desk Electric Computer Aids Chemical Research

➤ A NEW DESK-SIZED electric computing machine, designed to speed mathematical equation solutions in physical and chemical research, will cut tedious hours of work to minutes. It has been reported to the American Institute of Physics by Clifford E. Berry, Doyle E. Wilcox, Sibyl M. Rock and H. W. Washburn of the Consolidated Engineering Corporation.

The new calculator, designed during the war, will speed research and development in such diverse fields as the analysis of complex organic petroleum products, aircraft design, and electric circuit analysis.

The computer handles especially what is known to the mathematician as linear simultaneous algebraic equations. In spite of the impressive name, these are nothing but a more lengthy cousin of the elementary high-school variety of algebraic equations.

As many as twelve of these can be given to the computer to solve. This task, which might take an expert calculator five hours of tedious work to complete using conventional types of machines, can be done with much higher accuracy in a matter of forty minutes.

One reason for this speed is that each number needs to be handled only once, and no intermediate results have to be written down, effectively eliminating one of the most common sources of error.

To operate the computer, the given quantities of each equation are set up on knobs located on a revolving drum. Another one of a row of graduated dials, located on the front panel, is then adjusted to give a null indication on a small indicating tube in the center of the front panel. This process is repeated for each equation on a different set of knobs moved into view by means of a handwheel that turns the drum. The solutions are shown on the dials used to obtain the null-indications.

The computer is of the analog type that uses physical quantities to represent the numbers involved. In this new device, these quantities are the ratios of accurately known resistances, a feature that contributes to the high inherent accuracy of the computer.

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The 1945 *birth rate* in America was almost twice the death rate.

PHYSICS

Many New Radioisotopes

➤ THE ATOMIC bomb project has developed a "considerable number" of still-secret radioactive isotopes and superior methods of their production which will result in epoch-making advances in nuclear science, Dr. Glenn T. Seaborg, professor of physics at the University of California and co-discoverer of plutonium, stated.

Addressing a petroleum conference of the American Association for the Advancement of Science, Dr. Seaborg pointed out that more than 400 artificial radioactive isotopes, or "sisters," of ordinary elements have been made public. These elements are useful for tracer or "atom tagging" experiments in chemistry, physics, biochemistry and medicine.

"The work in connection with the plutonium project of the atomic bomb development has resulted in the production, or possibility of production, of a considerable number of additional radioactive isotopes, many of which are still in the secret category," Dr. Seaborg stated.

"More important than this, however, is the fact that this development has given rise to vastly superior methods for the production of a number of these isotopes and in particular a number of the most important ones. It seems realistic and entirely safe to predict that a large number of advances and discoveries will be made in the future, a few of them epoch-making."

Dr. Seaborg said that the "pile" technique of production and the 184-inch cyclotron now being built on the University of California campus will be instrumental in these advances and discoveries.

"The fission product elements, that is, the radioactive isotopes in the region of atomic numbers about 35 to 60 inclusive, are available in tremendous amounts," Dr. Seaborg said.

"The pile, as a powful neutron factor, also makes it possible to produce important amounts of practically any radioactive isotope which can be produced by neutrons and since almost all the important isotopes can be produced by neutron irradiation, this means that in the future practically all important isotopes should be available in huge intensities.

"In the near future there will also be available another device which will introduce another order of magnitude into the attainable energy of charged heavy particles, hence will undoubtedly give rise to another milestone in the field of transmutation.

"Within a few months the new 184-inch giant cyclotron at the University of California will be ready for operation. Using the new frequency modulation principle in order to compensate for the relativistic increase in mass at these tremendous energies, this instrument will generate deuterons at 200,000,000 electron volts and helium ions at 400,000,000 electron volts. This will result in many entirely new nuclear reactions."

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***ANCIENT VILLAGE**—This painting by Prof. M. Kneberg shows the three great council houses at one end of the public square, and in the foreground is a home under construction in the village on Hiwassee Island. The town was fortified with a stockade because the people who built it had evicted the earlier inhabitants.*

ARCHAEOLOGY

Early Indians Had Modern Troubles

➤ THEY HAD no atomic bombs, but other modern dangers including aggressor nations, famine and toothaches wiped out four different Indian peoples who inhabited an island on the Tennessee River in the course of 700 years, University of Tennessee archaeologists report.

Hiwassee Island, second largest island in the Tennessee River a few miles from Dayton, scene of the famous courtroom battle between Clarence Darrow and William Jennings Bryan, was the home of Indian tribes almost continuously from the twelfth or thirteenth century A. D. until 1818, excavations on the island reveal. Profs. T. M. N. Lewis and Madeline Kneberg of the University of Tennessee, who conducted the work at Hiwassee, say that the first Indians on the island were wiped out by an aggressor nation after perhaps two centuries.

At the time of the first European settlements in America, the island was the home of two more Indian tribes, who died from diseases brought over from Europe by the white men, according to the archaeologists.

This early and unintentional "germ warfare" also accounted for the fourth Indian inhabitants of Hiwassee, the Cherokees, who abandoned the island in 1818.

The investigators declare that dietary deficiencies were noted in most of the human remains of the inhabitants of the island with tooth trouble especially prominent. They estimate that at least 45% of the islanders at the time of Columbus suffered from toothaches.

Science News Letter, June 29, 1946

ASTRONOMY

Mercury Appears Again

This seldom-seen planet appears for the second time this year. Venus, Mars and Jupiter are also visible and very bright during July.

By JAMES STOKLEY

▶ THE EARLY days of July bring us, for the second time this year, a chance to observe the seldom-seen planet Mercury. On July 5 it is at its farthest east of the sun, so it remains visible above the western horizon for a short time after the sun goes down. For a few days before and after this it should be possible to get a glimpse of it at twilight just above the horizon and a little to the north of the west point.

Higher than Mercury, many times brighter and visible through the month is the next planet out from the sun, Venus. It is in the constellation of Leo, the lion, and about July 13 it passes very close to the star Regulus. On the accompanying maps, drawn for July 15, it is shown after it has gone past. These, by the way, depict the heavens as at 10:00 p. m., standard time (or 11:00 p. m. D. S. T.) at the beginning of the month, and an hour earlier in the middle. Since Mercury sets before this hour, it is not shown.

Mars in Leo

Mars is a little higher still, in the constellation of Leo, the lion, but about a hundred and twentieth as bright as Venus, for it is now far out beyond the sun. And still higher and farther to the south, in the next constellation of Virgo, the virgin, stands Jupiter. It is brighter than any other star or planet, except for Venus, which exceeds it 5.75 times. The only other planet that ever is visible to the naked eye, Saturn, is now in the constellation of Cancer, the crab, and too close to the sun to be seen in July.

Among the stars which, like the sun, shine with their own light, Vega, high in the east in Lyra, the lyre, is brightest. Below it is the northern cross, now on its side, which is part of Cygnus, the swan, and of which Deneb is the brightest star. Lower, and a little farther south, is the figure of Aquila, the eagle, with Altair. One faint star just above this, and another the same distance below, help in locating it.

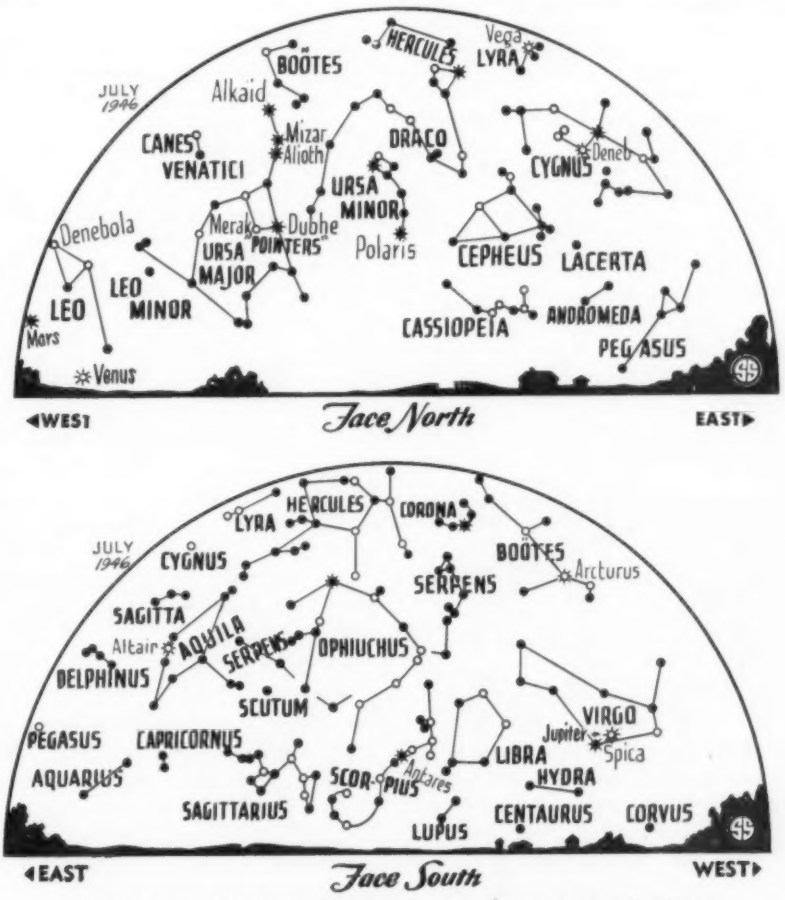
In the northwest, hanging downward from the end of the handle, is the Great Dipper, in Ursa Major, the great bear. At the bottom are the two stars known as the pointers, which indicate the direction of Polaris, the pole star. The Dipper contains no first magnitude stars, but its handle, if you follow its curve southwards, shows the direction of two others. The first is Arcturus, in Bootes, the bear driver, and the next is Spica, in Virgo, the group where Jupiter is now residing.

Finally, there is one more first magnitude star on our maps. This is Antares, in Scorpius, the scorpion, low in the south; a constellation that is characterized by the curved row of stars that form the scorpion's tail. Antares is red in color, which also serves as a means of identification.

Though practically everyone knows that Mercury is the innermost of the planets, few have ever seen it. Most of the time it is so nearly in the same direction as the sun that it is lost in the glare of that body. Once every 88 days it makes a revolution around the sun, but during this time, which is the Mercurian "year," the earth also has advanced in its orbit. This means that the time which Mercury requires to return to the same position with respect to us is 116 days, and astronomers call this its "synodic period."

Mercury Now Farthest East

Once in this period it is farthest west of the sun, as it was on April 23. Then it rises ahead of the sun, and may be glimpsed near the horizon in the morning twilight. Also once in each synodic period it is farthest east of the sun, and follows it across the sky, remaining briefly above the western horizon at dusk. It was at such a position on March



9, and again on July 5. This is why the early days of July bring us one of the rare chances we have to see it.

At an average of 35,946,000 miles from the sun, Mercury's distance is about 39% of that of the earth's. This means that it receives far more heat from the sun than we do—about seven times as much. Also it has no atmosphere to ameliorate this flood of radiation. The reason for this is that it is not big enough to hold a layer of air, even if we could provide it with one. Though we are used to thinking of the force of gravity as attracting objects big enough to see and feel, it also pulls on the molecules of nitrogen and oxygen that make up our atmosphere. Without this pull the movements of these molecules would soon take the atmosphere away, never to return. With its smaller size the pull of gravitation on Mercury is only about a quarter as much as ours. This is not enough to hold an atmosphere against its own tendency to disperse.

But despite Mercury's proximity to the sun, a few years ago Mt. Wilson astronomers, using a heat-measuring device called a thermocouple on their great 100-inch telescope, the largest in the world, found that part of Mercury, at least, was not radiating any appreciable heat. This means that its temperature is close to the absolute zero of 460 degrees below zero Fahrenheit. This was for the half of the planet turned away from the sun. The hemisphere toward it, on the other hand, was found to be about 660 degrees Fahrenheit, above that at which lead will melt.

This is evidence that the planet turns once on its axis in the same 88-day period that it takes to encircle the sun. It always keeps the same face toward that body, just as the moon does toward the earth. Probably it does so for the same reason. Though there is no water on Mercury, it may once have been in a more plastic condition than it is now, and the sun would have caused great tides. As it revolved on its axis, these tides would have had a braking effect, With the planet always turning the same part sunwards, the braking action ceases, and we end with the condition that now prevails.

Celestial Time Table for July

July	EST	
1	2:18 p.m.	Moon passes Venus
3	1:59 a.m.	Moon passes Mars
	6:00 a.m.	Earth farthest from sun, distance 94,452,000 miles
5	2:00 p.m.	Mercury farthest east of sun
6	12:15 a.m.	Moon in first quarter
	6:28 a.m.	Moon passes Jupiter
10	3:00 a.m.	Moon farthest from earth, distance 251,900 miles
14	4:22 a.m.	Full moon
21	2:52 p.m.	Moon in last quarter
25	10:00 p.m.	Moon nearest, distance 226,000 miles
28	6:53 a.m.	New moon
31	9:53 a.m.	Moon passes Venus
	5:43 p.m.	Moon passes Mars

Subtract one hour for CST, two hours for MST, and three for PST. Add one hour for the corresponding Daylight Saving Time.

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PHYSICS

200-Foot Chimney Aids in Study of Smoke Nuisance

A HIGH, smoking chimney usually connotes industrial activity at its base. But scientists at the meeting of the American Geophysical Union heard Dr. Phil E. Church of the University of Washington tell of a 200-foot smokestack with no factory attached, put up purely for the purpose of giving off smoke. It was smoke without a fire, too, for it consisted of the white oil-fog emitted by an Army M-1 smoke generator such as was used during the war to conceal troop movements and military installations.

Purpose of this fireless, factoryless smokestack was to study the behavior of smoke in the air at various wind velocities, and its degree of dilution with air at various distances from the source. These are of course matters of much concern in the placing of factories and power plants, if complaints about smoke nuisance are to be avoided.

Amounts of smoke in the air were determined by drawing air through a tube past a photocell. Even very small quantities of the oil-fog would cause a definite shift of the pointer on the reading instrument. The "smoke-eye" was mounted on a truck that could travel over any terrain to reach a spot where a reading was wanted.

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Do You Know?

World records of lifting heavy loads to great heights by airplanes have been recently broken by B-29 Army planes; one lifted a 2,200-pound load to 45,000 feet altitude, and another 11,000 pounds to 42,780 feet.

Irish moss collecting is the oldest seaweed industry in America; known also as carrageen, it has been harvested for a century to make blancmange, and now for carrageenin, a stabilizer in chocolate milk.

With increased use of gas turbines and jet planes, the total amount of high-octane *fuels* for aviation will decrease because in them octane number is not the critical characteristic.

German jams during the war, called mixed fruit jams, were made from a combination of pumpkin, rhubarb, green tomatoes, beets and various fruits.

The *Torrey pine* is found only on a strip of land two miles wide and eight miles long near San Diego, Calif.

American *"desert forests"* are not timberlands but fantastic areas of tree-lilies, cacti, yucca and similar growths.

Britain's *bread loaf* is now seven-eighths as heavy as its former loaf.

DENTISTRY

Susceptibility to Tooth Decay May Be Inherited

➤ THE MOTHER who says, "My daughter gets her poor teeth from me," implying that there is some inherited factor in dental disease, is propably right.

Susceptibility to tooth decay seems to run in a family, very likely is inherited and may be sex-linked, Dr. Henry Klein, Senior Dental Officer, U. S. Public Health Service, found from a study of 5,400 parents and children in 1,150 families. Details of the study, made on families of Japanese ancestry at the Colorado River Relocation Center, are reported in the *Journal of the American Dental Association* (June).

When both parents had little or no signs of dental disease, their children also had good teeth. When both parents had poor teeth, the children also had much dental trouble. If one parent had good teeth and the other had medium or very bad teeth, the children had more tooth decay than children whose parents both had good teeth, but less than that seen in children with both parents having poor teeth.

The state of the mother's teeth seemed more closely related to that of the daughter's than the state of the father's teeth did.

Science News Letter, June 29, 1946

CHEMISTRY

"T-13" Keeps Down Lint, Dust and Bacteria

➤ IF YOU WANT to keep lint, dust and disease-spreading bacteria from scattering around your house from bedding, clothes, towels and floors, the U. S. Army has the answer to your problem.

An oil emulsifying agent developed during the war to cut down the spread of respiratory diseases in Army barracks has just been released. The oil emulsion, known as "T-13", was applied to woolen and cotton materials during the final rinse in the normal laundering process. Quantities of the oil depended on the type of material and 10 or 12 minutes more time was required in the normal laundering process, the Army reports.

"T-13" contains a medicinal mineral oil and "Triton NE," a non-ionic, emulsifying agent.

Dry cleaning removes the emulsion completely, but ordinary washing will not.

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ORNITHOLOGY

NATURE RAMBLINGS

by Frank Thone

➤ ON NATIONAL HOLIDAYS, especially Independence Day, we are wont to swell our chests with pride at the thought of him, while our bell-tongued orators laud him above the clouds. Yet even when they laud him as a "glorious bird of prey" they are indicting him. For by very necessity, a bird or beast of prey must attack animals smaller or weaker than itself. And as a nation we have instinctively abhorred such a course; our history books are rather shamefaced about the time or two we have done that kind of thing.

Anyway, the bald eagle is not primarily a bird of prey. True, it does catch some of its food alive—though the stories of eagles carrying off children do not seem well founded. But to a very large extent the bald eagle feeds on what it finds already dead. It does not go in for carrion ripe to the taste of a buzzard, but if it finds a dead rabbit or lamb fairly fresh it will leave only scraps for its more ignoble distant cousin. One of Audubon's finest plates shows a bald eagle with its talons in a huge catfish that is evidently quite dead. That is not imagination: Audubon saw the things he painted.

These somewhat plebian traits of the bald eagle were well known to our earlier scientists. It was not they who chose him as the national emblem, but the politicians of our earlier day. Benjamin Franklin, who was a real scientist as well as a real statesman, protested vigorously but to no avail; he wanted the turkey-gobbler emblazoned on the U. S. Great Seal and coins instead.

It made no difference: the heraldic eagle was popular, and will undoubtedly remain where he is, so long as we are a nation. We'll overlook his shortcomings, just as we find excuses for the faults and peccadillos of our heroes.

But while we enshrine this largely imaginary eagle, we are doing our utmost to exterminate the real ones. Worst blow was the felling of the primeval forest that once covered much of this land; eagles choose dead high trees as nest sites when they can, and few such sites remain now.

Nowadays the eagle is a harried and hunted bird in one of the few places where he survives in number—the Alaska coast. Fisheries men and sheepmen alike malign him, and having given him a bad name they shoot him for it whenever they can.

We Americans are a strangely self-contradictory people.

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RADIO

Shoran Will Help Chart the World

➤ A WARTIME RADAR navigation device, used to assist bombing through overcast, will now be employed in charting the earth's surface. Shoran, the electronic device is called; the word is coined from "short-range" radar.

Lt. Col. Carl I. Aslakson of the Army Air Forces has declared that with Shoran "it would be possible to establish a geodetic control network of the entire world and plot the distance of every point within a few feet of every other point on the globe."

The method has been checked and proved in the Denver area, and in addition, has been used by the U. S. Coast and Geodetic Survey in surveys of the ocean bottom in Alaska. It will soon be used to chart the coast of Maine, and also in the Caribbean area.

Shoran makes use of high frequency radio waves which are transmitted and measured in terms of miles, and down to feet where necessary. As developed for bombing, the bomber was equipped with two transmitters which sent pulse signals to two ground stations. These, located at least 100 miles apart, received the signals and re-broadcast them back to the plane. The interval of time between the sending and the receiving of the signals was measured electronically and translated into distance.

With the distance between the stations known, and the distance from each determined by the radio signals, the mathematical method of triangulation accurately gave the plane its location. The pilot had no figuring to do; the triangulation was automatically computed by electronic devices.

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• Books of the Week •

DAVID RITTENHOUSE: Astronomer-Patriot—Edward Ford—*Univ. of Pennsylvania Press,* 226 p., $2.50. A biography of one of America's outstanding citizens who died 150 years ago, who, though a self-educated country boy, became internationally known as an inventive genius and astronomer and whose telescopes and many clocks are still highly praised for their skillful workmanship.

THE FEVER BARK TREE: The Pageant of Quinine—M. L. Dural-Reynals—*Doubleday,* 275 p., $2.75. The story of man's fight against malaria from the time when it killed Alexander of Macedon to World War II, and of quinine, which, until recently, has been the only effective agent for controlling the disease.

HANDBOOK OF LIZARDS: Lizards of the United States and Canada—Hobart M. Smith—*Comstock,* 557 p., illus., $5.75. An examination of 136 species of lizards under the following topics: range, size, color, scalation, recognition characters, habitat, habits, and problems for future study.

LINCOLN'S INCENTIVE SYSTEM—James F. Lincoln—*McGraw,* 192 p., illus. and diagrs., $2. A theory of incentive management which presents a philosophy of industry and life, and depends for its success on the development in the individual of his latent abilities.

MODERN METALCRAFT—John L. Feirer—*Manual Arts Press,* 288 p., tables and illus., $3.50. A treatment of processes in art metal work, giving illustrations of finished articles and the steps in their making, various methods in filing, shaping, soldering, heat-treating and other finishing processes.

THE PSYCHIATRY OF ENDURING PEACE AND SOCIAL PROGRESS—G. B. Chisholm, M.D.—*William Alanson White Psychiatric Foundation,* 44 p., paper, 40 cents. The William Alanson White Memorial Lectures by G. B. Chisholm, M.D., with foreword by Abe Fortas and discussion by Henry A. Wallace, Watson B. Miller, Samuel W. Hamilton, Ross McC. Chapman, and Harry Stack Sullivan.

QUALITATIVE ORGANIC MICROANALYSIS—Frank Schneider—*Wiley,* 218 p., tables and diagrs., $3.50. Instructions for the preparation, isolation, purification and identification of very small quantities of organic compounds.

THE STAR ATLAS AND NAVIGATION ENCYCLOPEDIA—S. S. Rabl—*Cornell Maritime,* 161 p., illus., $5. How to determine speed, distance, time, and position; how to take bearings with a radio direction finder; how to use the sextant; how to use the NAUTICAL ALMANAC, H. O. 208, H. O. 211, and H. O. 214; how to use the stars in navigating.

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ENGINEERING

Tractor Hydraulic Device Works Trailer Mechanism

➤ A SIMPLE, relatively inexpensive attachment to an ordinary light tractor of the wheeled type enables the tractor to be used with scrapers and other earth-moving machines having hydraulically operated mechanism. Patent 2,402,449 has just been awarded for this invention to Harvey W. Rockwell, Cedar Rapids, Iowa, who has assigned it to the Laplant-Choate Manufacturing Company, Inc., of the same city.

The invention provides a pump, oil tank and control valve all in a single unit in a single housing which may be easily attached or removed from the front of the tractor. A control is within reach of the driver. The pump is operated by the tractor engine.

The oil tank is mounted just above the pump, and over it is the control valve from which supply lines extend along opposite sides of the tractor to the rear. These, by simple connectors, are attached to the hydraulic mechanism in the equipment pulled by the tractor.

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CHEMISTRY

Radioactive Carbon 14

➤ THE METHOD of manufacturing by means of atomic energy the radioactive kind of carbon isotope 14 that may result in discovering the causes of diseases and many biological and chemical processes was made known in a paper before the American Physical Society by L. D. Norris, A. H. Snell, E. P. Meiners, Jr., and L. Slotin of the Clinton Laboratories, Oak Ridge, Tenn.

The fission of uranium 235 or plutonium in what is called a "chain reacting pile" supplies the atomic bombardment that creates the special kind of "tagged" carbon. The process actually used at Clinton Laboratories is continuous extraction from a liquid such as ammonium nitrate. The solution is circulated through the pile with a glass centrifugal pump. Nitrogen in the ammonium nitrate is transmuted by neutrons and protons into the carbon isotope 14, which is not only radioactive but is two atomic weight units heavier than the most ordinary kind of carbon in nature. The carbon is carried out, mostly as carbon dioxide, with other gases resulting from radiation decomposition of the liquid. The carbon is precipitated from the gas stream as barium carbonate. About 5% concentration of the carbon 14 is obtained.

Batches of solid nitrogenous material can also be irradiated to obtain the useful carbon radioisotope or continuous extraction from some kind of an emanating nitrogenous substance can be used.

About 20 different pairs of atomic nuclei can be produced when an atom of uranium or plutonium divides or fissions with a release of the atomic energy, a paper by Dr. E. P. Wigner of Princeton and Dr. Katharine Way of the Metallurgical Laboratory, Chicago, reported. Each resulting nucleus is in general unstable and goes through several radioactive beta-ray transitions before it reaches stability. Each transition has its own peculiar radiations and lifetime.

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Englishmen were long afraid to eat *tomatoes* because the plant is a close relative of the European deadly nightshade.

•New Machines And Gadgets•

❁ *STOWAWAY BED, in reality merely a mattress and pillow in one piece, is made of a cotton fabric impregnated with a synthetic rubber compound, and is filled with air when used. When inflated and laid on the floor, it is a comfortable cot; deflated, it takes less space than a blanket.*

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❁ *"WHIPS" TRAILING from the wings and tail of airplanes discharge the static electricity created by all-metal planes, that interferes with radio reception. The whips are 10-inch cotton ropes impregnated with a silver compound which gives electrical conductivity. Plastic tubes enclose nearly nine inches of the ropes.*

Science News Letter, June 29, 1946

❁ *IMAGE CORRECTING lens, together with a reflecting glass mirror, enlarges the television picture on a five-inch cathode-ray tube to fill a screen 18 by 24 inches in size. Wave-like curves in the lens compensate for spherical aberrations introduced into the pictures by the reflecting mirror.*

Science News Letter, June 29, 1946

❁ *ANTENNA for FM (frequency modulation) broadcasting is called the "clover-leaf" because its radiating units are in the shape of a four-leaf clover. The antenna is made up of two or more vertically stacked radiating units, spaced a half-wave length apart.*

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❁ *COILED CORD for ironing, shown in the picture, has covering of the synthetic rubber, neoprene, which resists*

abrasion, tearing and heat from the iron if touched momentarily. The springy cord will stretch six times its retracted length.

Science News Letter, June 29, 1946

❁ *TRANSPARENT envelope, made in various sizes for cards, shop work orders, maps, blueprints and record sheets, has plastic faces bound with leatherette edges. The plastic is flame- and moisture-proof and is uninjured by heat or oil.*

Science News Letter, June 29, 1946

❁ *DRAFTING instrument molded in two parts of a transparent yellow plastic, is a combination graduated square, with a removable miter arm pivoted in the center of a circular projection at the outer angle of the square. Back edges of the legs of the square have French curves.*

Science News Letter, June 29, 1946

❁ *PAGE-TURNING device for invalids has a rotating drum with a thread attached on which are tied metal clips at double book-width intervals. The thread, passed over the book and clips fixed in order to succeeding pages, pulls one page over at a time as the drum rotates.. Rotation is controlled by a chin-operated electric switch.*

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If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 317.*

To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.

Question Box

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ASTRONOMY

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BIOCHEMISTRY

Radioactive iron tracer experiments prove hemoglobin is manufactured by what body process? p. 405.

CHEMISTRY

What method recently developed may be used to discover causes of diseases and many other chemical and biological processes? p. 411.

What method was used in the invention of two new sugars? p. 403.

What oil emulsifying agent developed during the war keeps lint, dust and bacteria from spreading? p. 409.

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What studies show persons may inherit tooth decay? p. 409.

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